Chl-specific flag?

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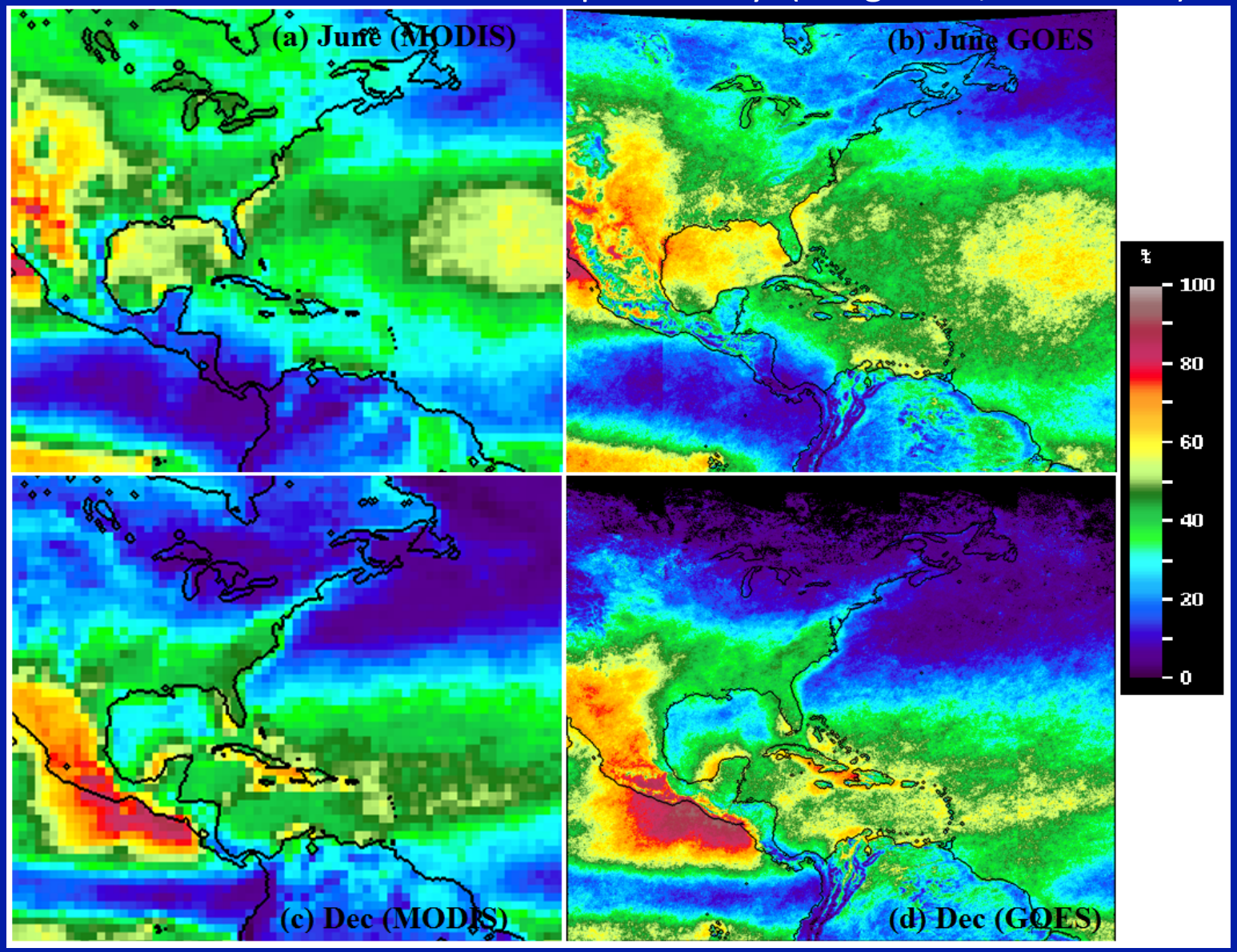
Rule of Thumb: more is better

MODIS and GOES cloud-free probability (Feng et al., submitted)



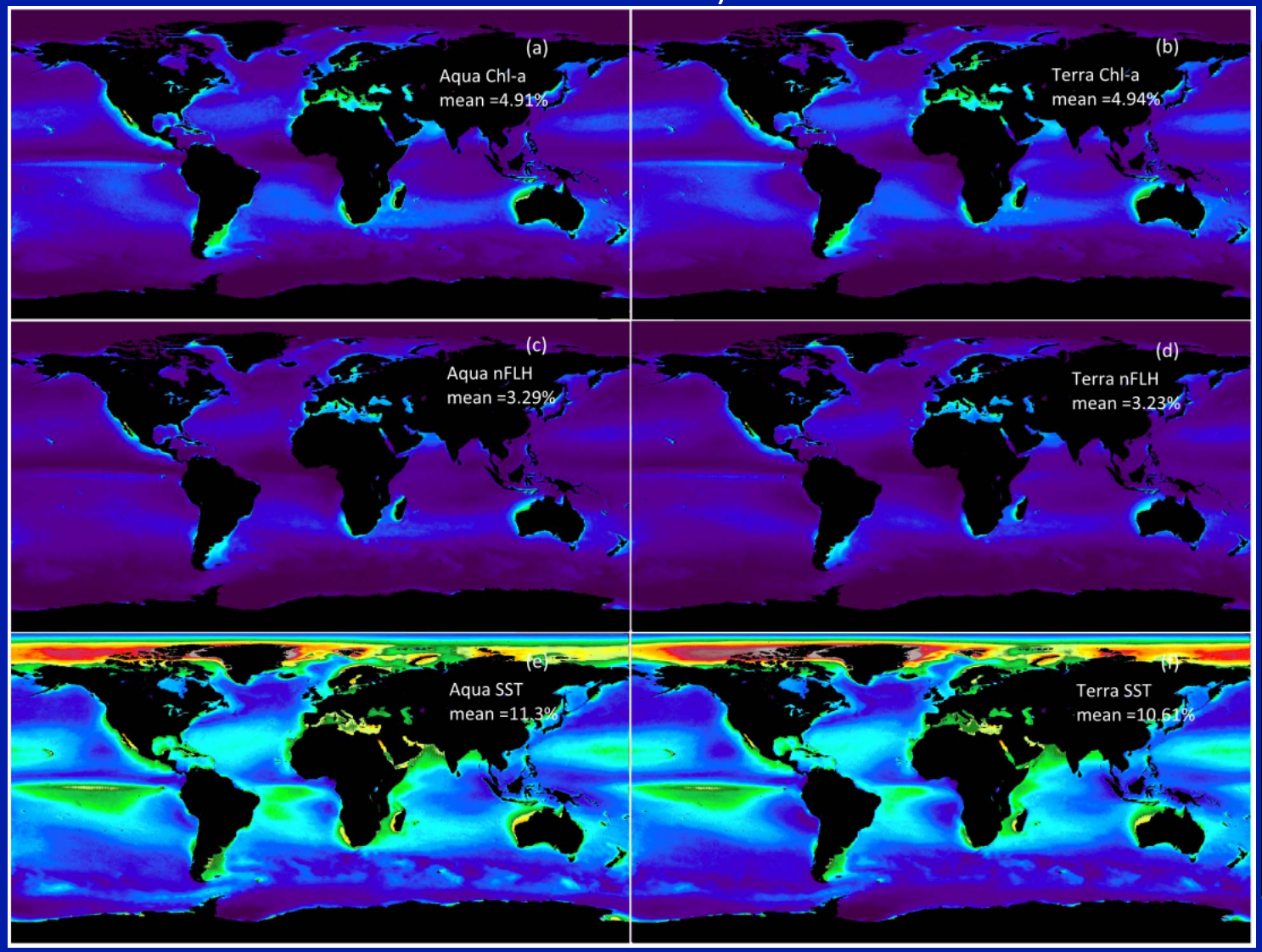
The Reality

Daily percentage valid data from Aqua and Terra 2003 – 2014 (Feng and Hu, 2016a)

Chl

nFLH

SST



Default Chl flags

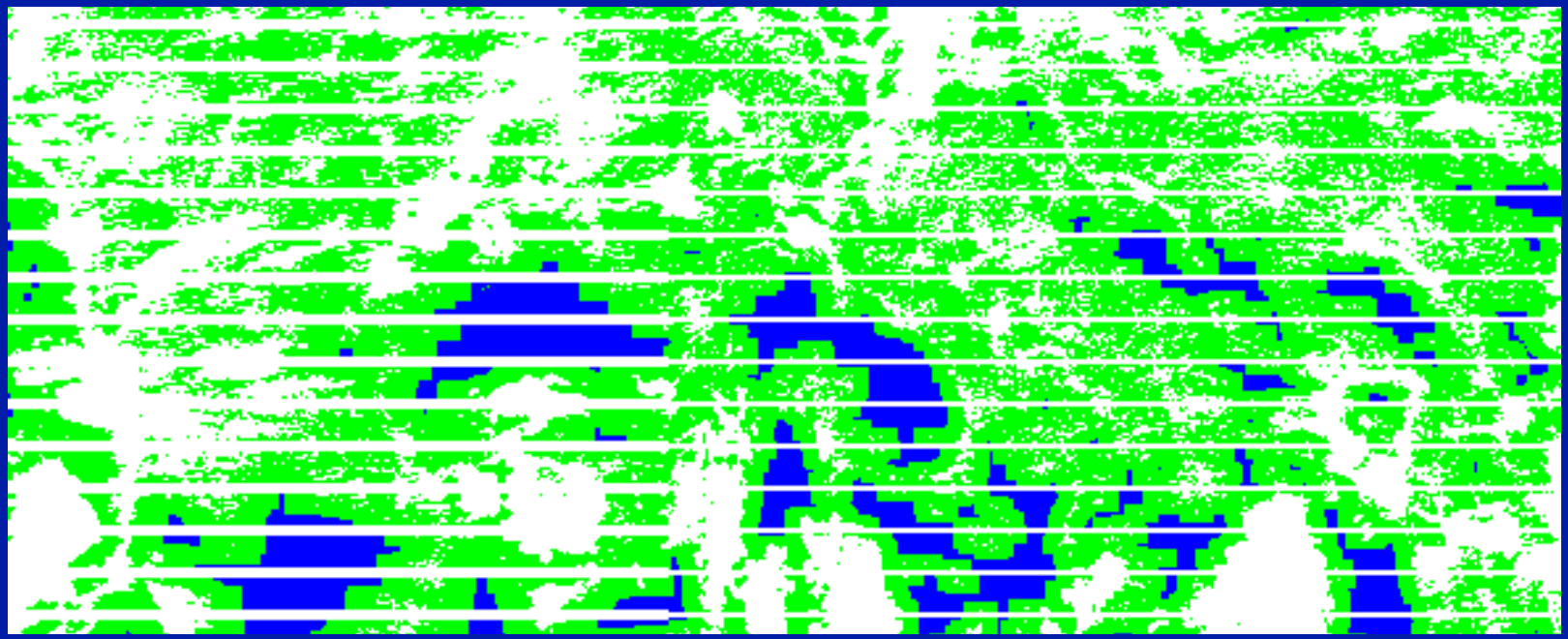
Global composite data is always a trade between quality and quantity

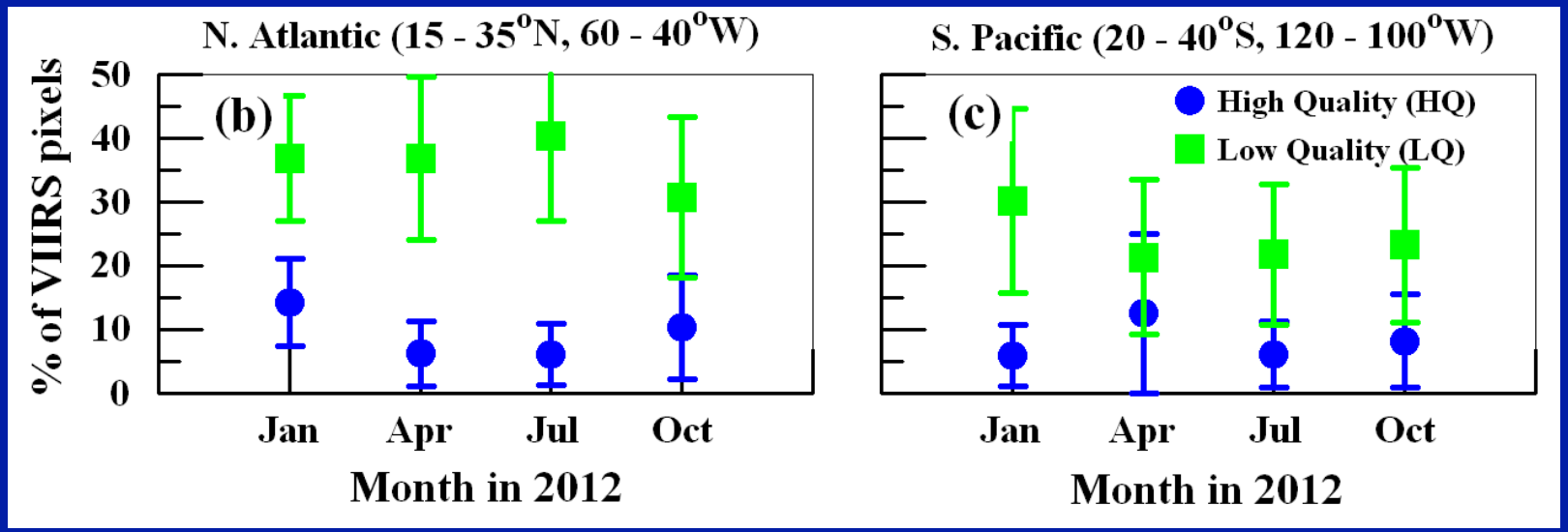
TABLE I

LEVEL-2 PROCESSING FLAGS APPLIED TO SATELLITE DATA USED IN THIS STUDY. NOTE THAT THESE ARE THE NASA STANDARD FLAGS THAT HAVE BEEN USED TO PRODUCE LEVEL-3 GLOBAL DATA PRODUCTS

Bit Position (0 Based)	Flag Name	Description
0	ATMFAIL	Atmospheric correction failure
1	LAND	Pixel is over land
3	HIGLINT	High sun glint detected
4	HILT	Very high or saturated radiance
5	HISATZEN	High sensor view zenith angle (> 60°)
8	STRAYLIGHT	Likely straylight contamination
9	CLDICE	Probable cloud or ice contamination
12	HISOLZEN	High solar zenith angle
14	LOWLW	Low water-leaving radiance
15	CHLFAIL	Failure to derive chlor-a product
16	NAVWARN	Reduced navigation quality
19	MAXAERITER	Aerosol iterations exceed maximum allowable
21	CHLWARN	Derived chlor-a product quality is reduced
22	ATMWARN	Atmospheric correction is suspect
25	NAVFAIL	Navigation failure
26	FILTER	User-defined

Lack of coverage is NOT always due to clouds

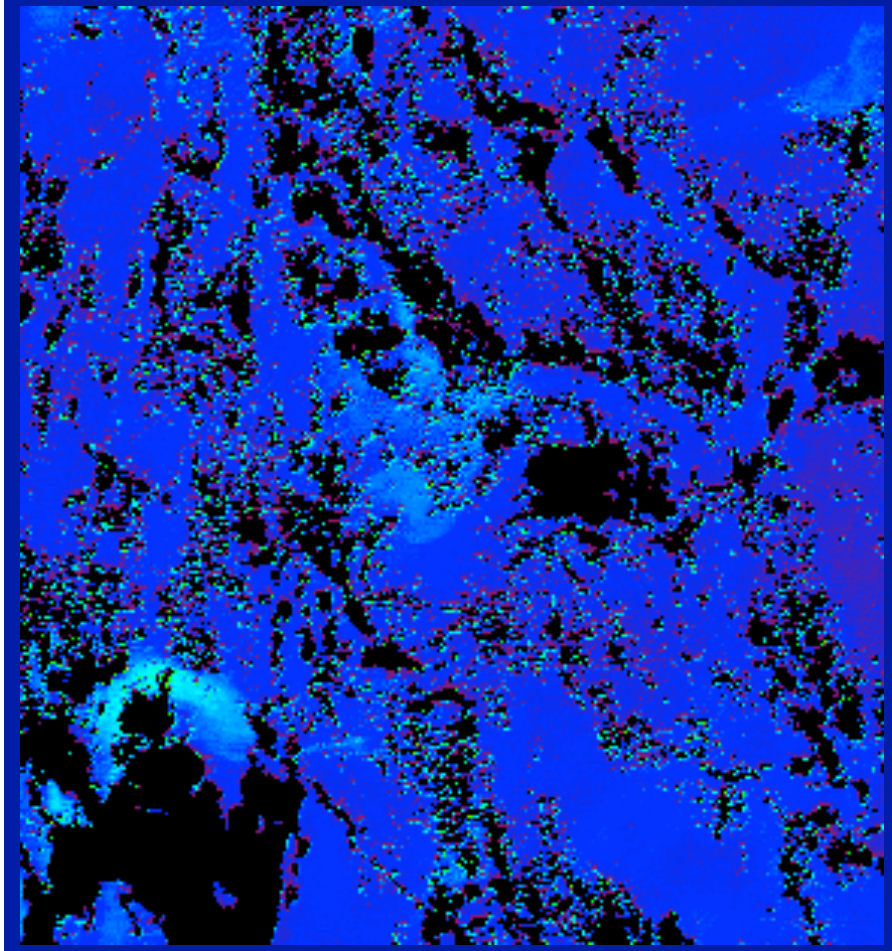


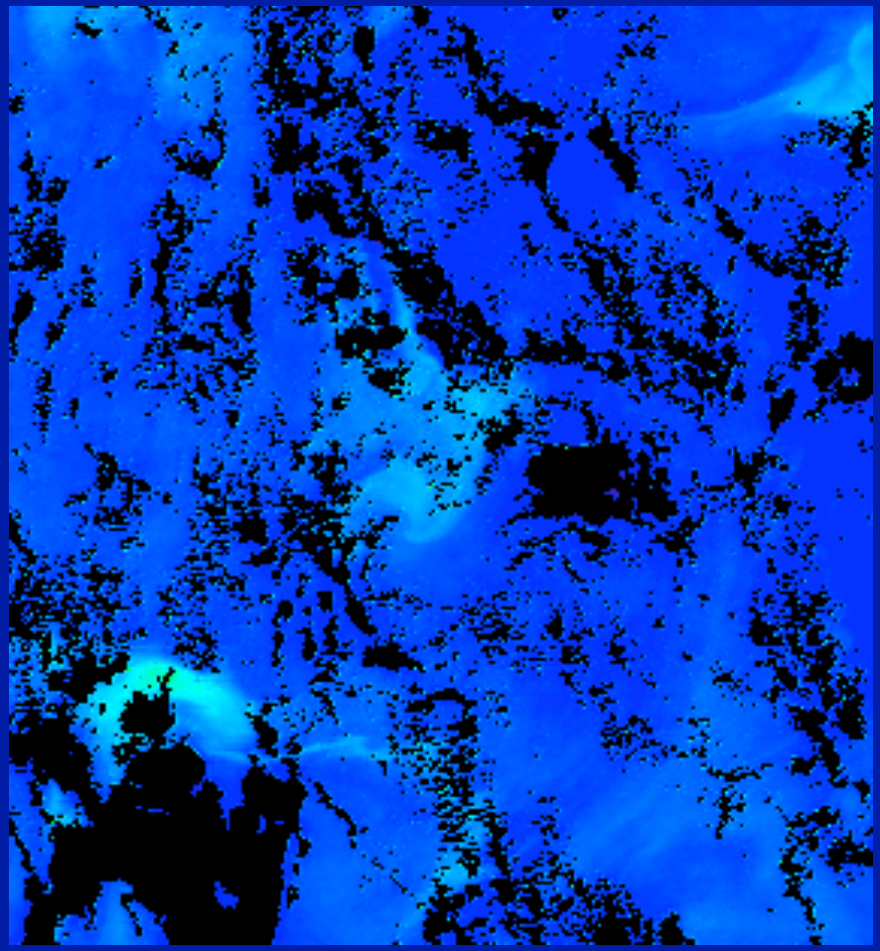


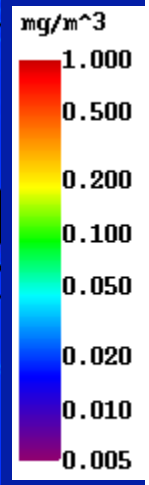
Relax Chl flag around cloud edges?

Chl Ocx

Chl OCI

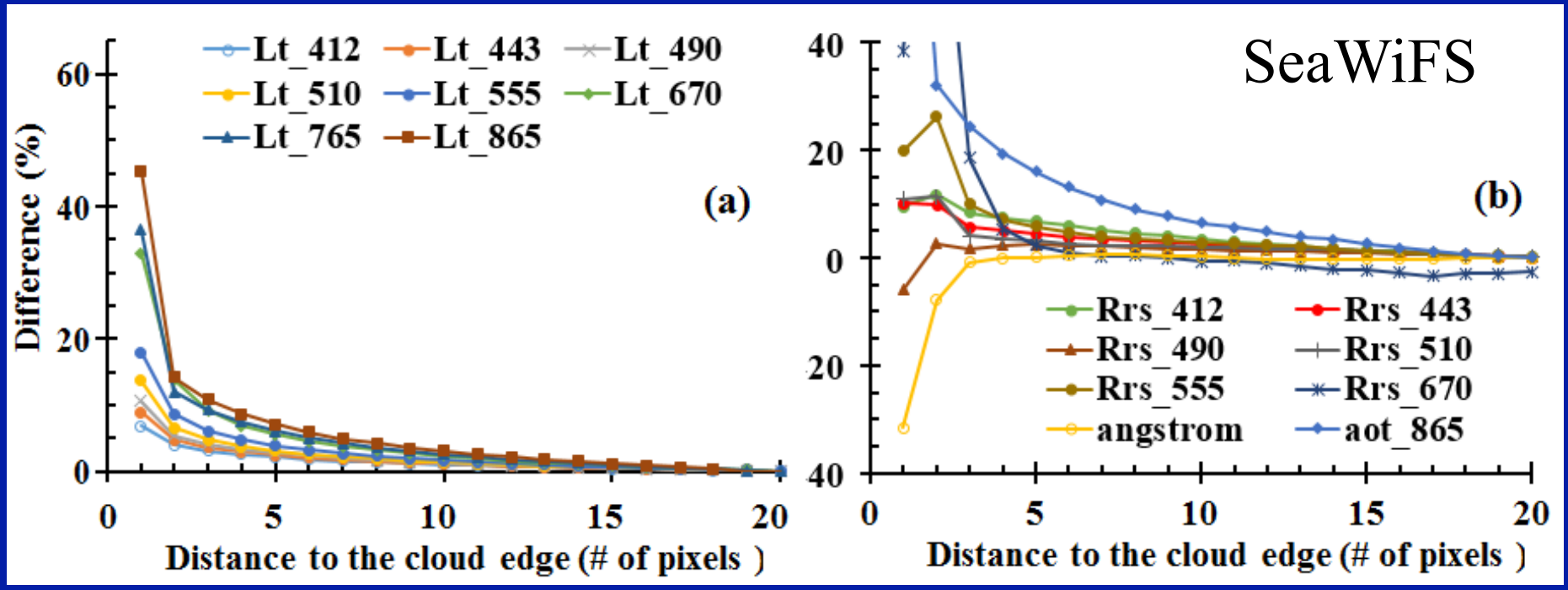






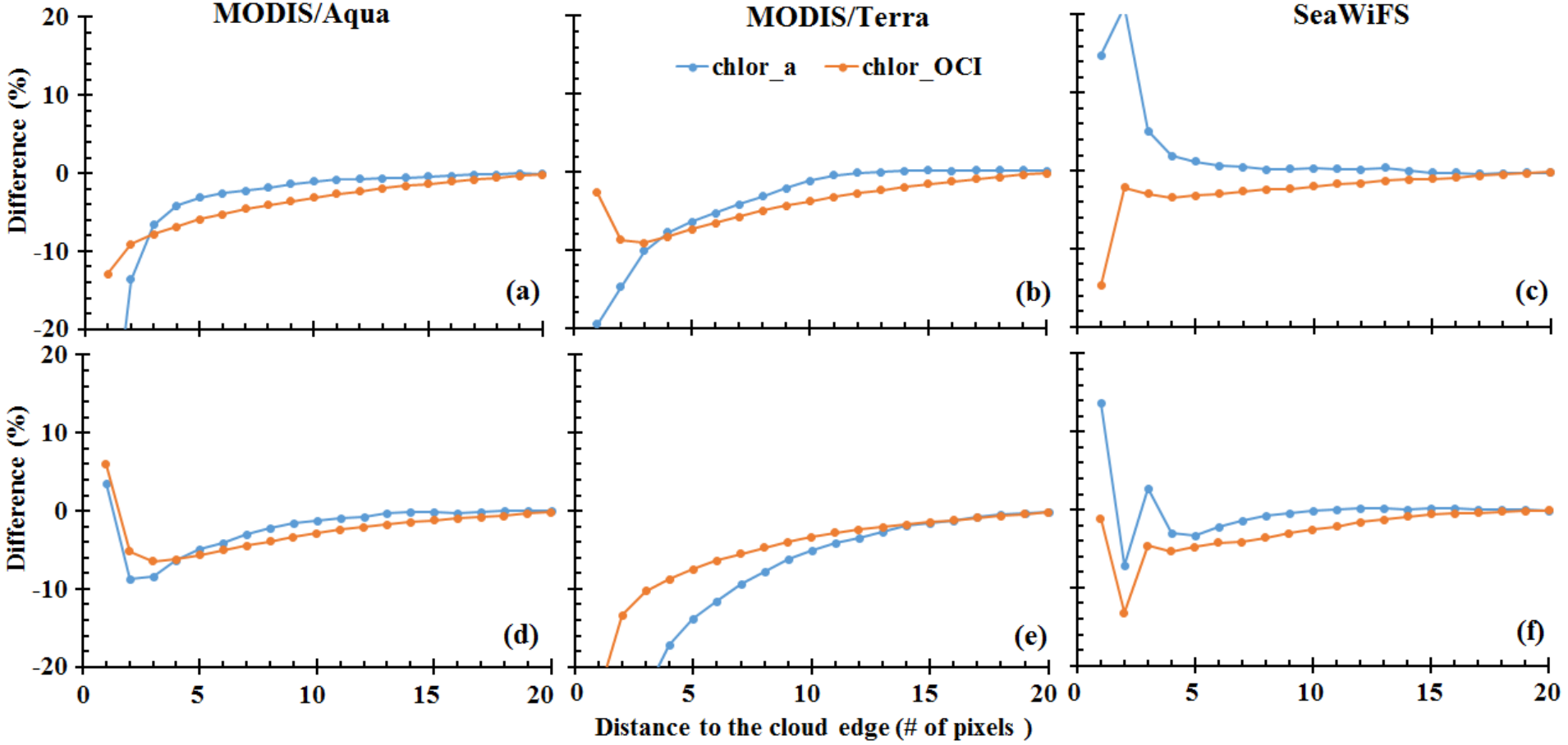
Effects of cloud adjacency

ME-free direction (Feng and Hu, 2016b)

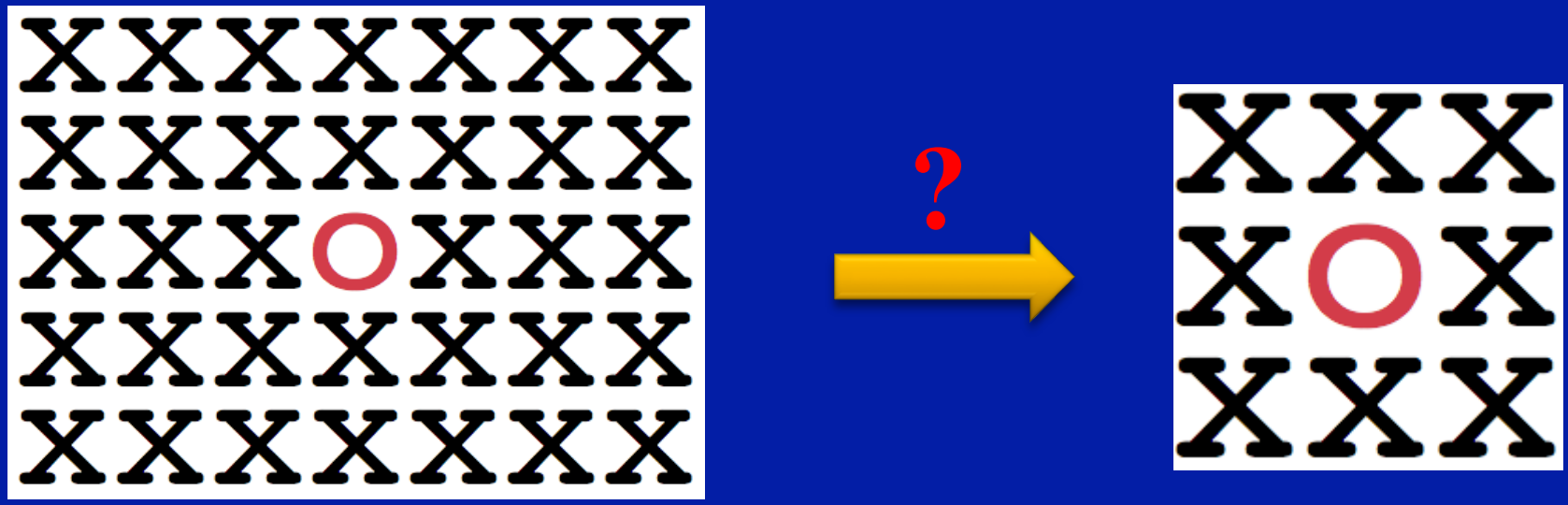


Effects of cloud adjacency

ME-free and ME-containing directions (Feng and Hu, 2016b)



OCI Chl-a "immune to" cloud adjacency

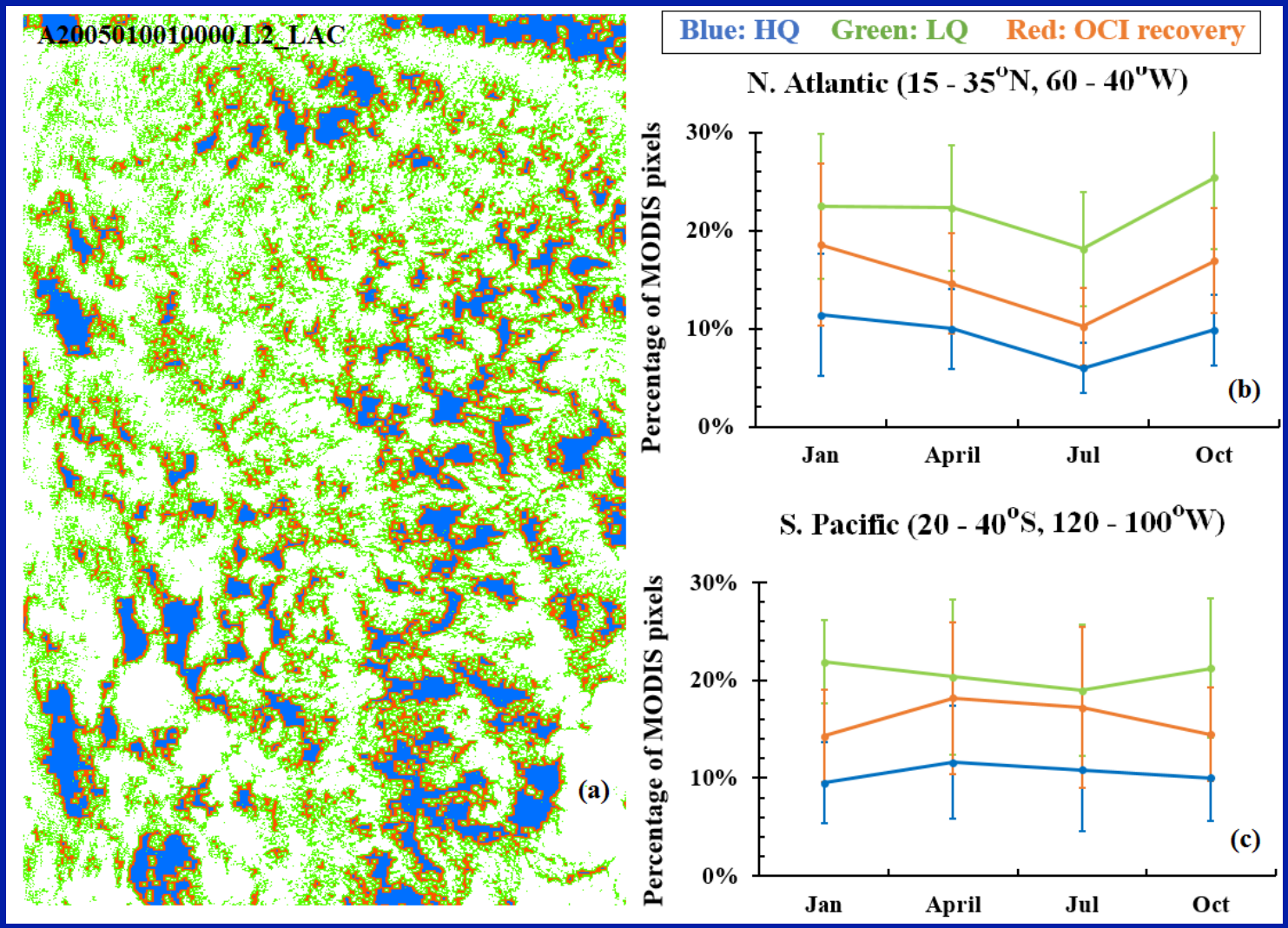


	MODISA		MODIST	
	3x3	5x5	3x3	5x5
East	4.9	3.6	-3.8	-6.9
West	-1.1	0.2	0.9	1.3
South	2.2	0.4	-3.1	-5.0
North	-3.0	-0.5	-9.9	-10.0

The SeaDAS operational masking window (7x5) could be changed to 3x3 with the OCI Chl-a algorithm, without losing confidence for the remaining data

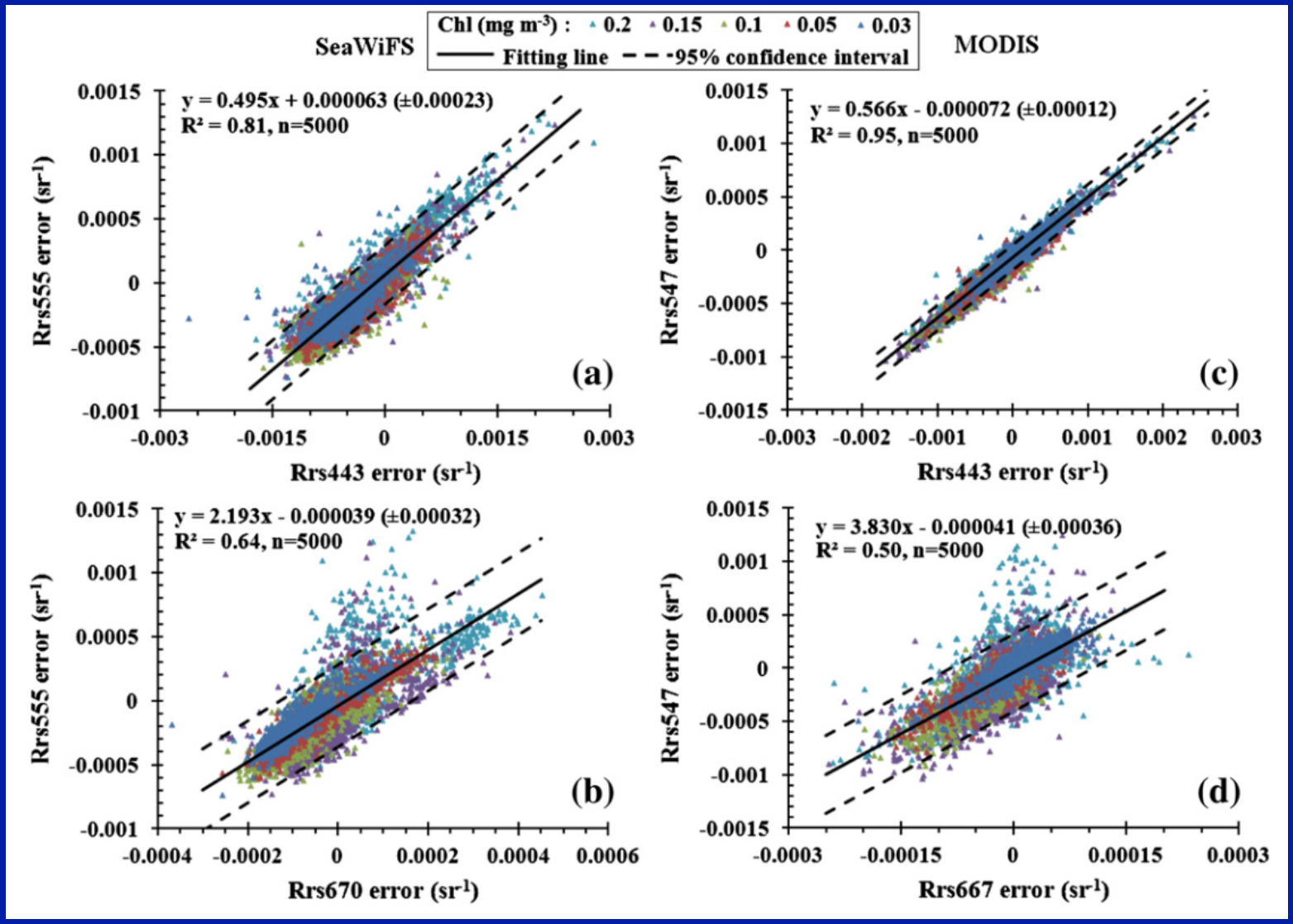
Chl-specific L2 Flag for 3x3 stray light?

Unfortunately, of the entire global data and SeaBASS archive, we could not find any field measurement just in the "recovered" pixels for validation



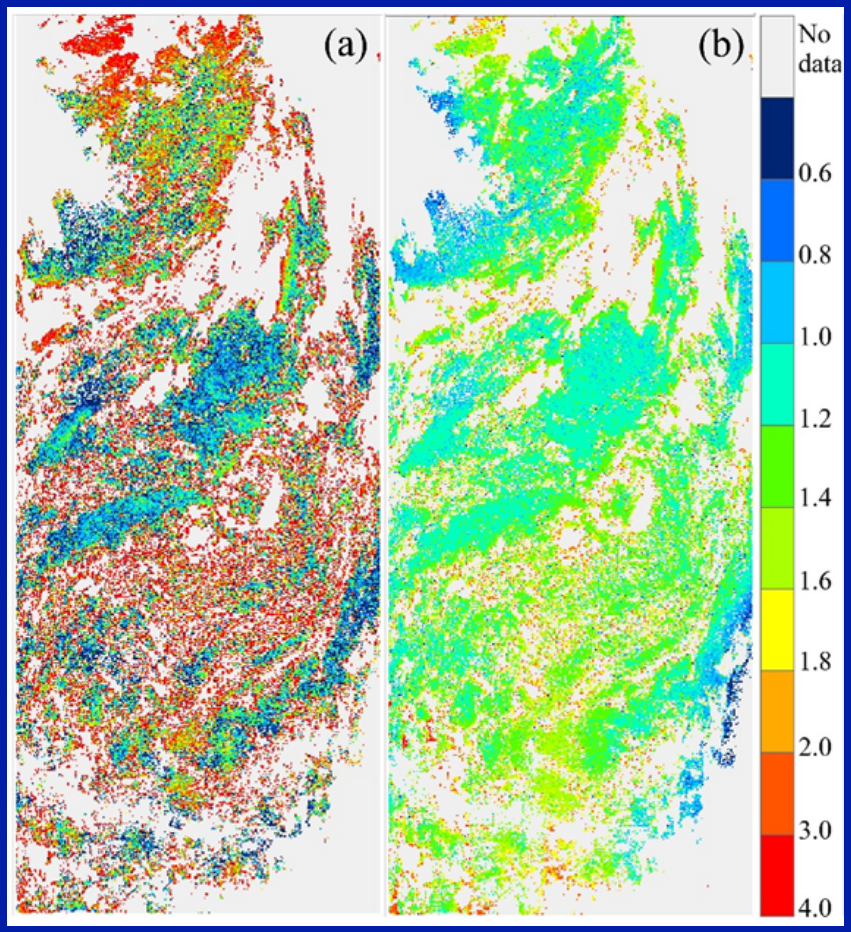
Rrs recovery?

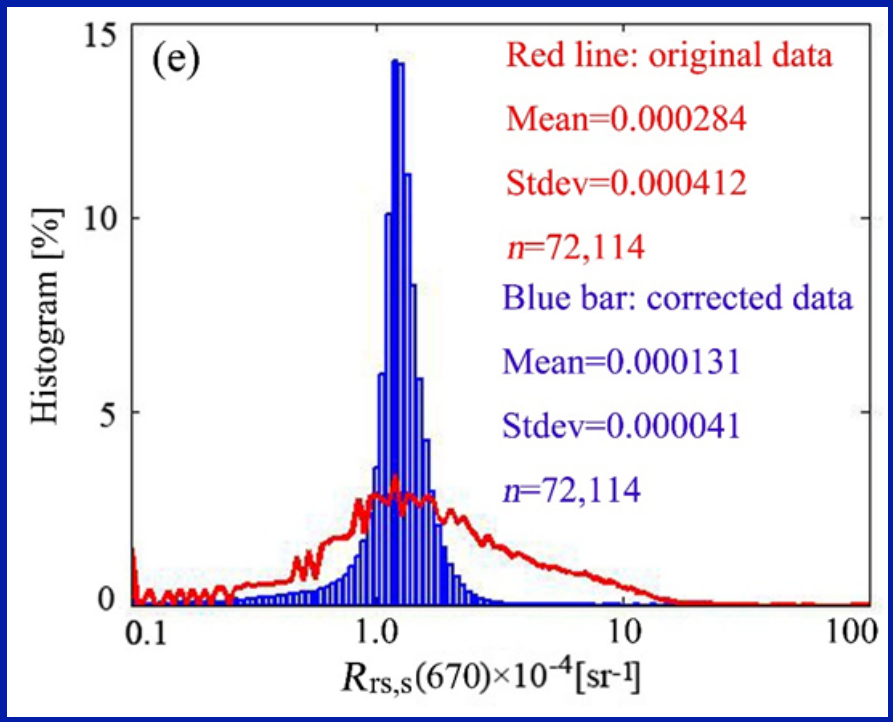
Rrs errors are NOT spectrally independent (Hu et al., 2013)



Rrs recovery?

Neural-net QAA relatively immune to input Rrs errors, therefore can be used to derive IOPs and "corrected" Rrs simultaneously (Chen et al., 2016, JGR). The scheme is applied to all non-zero Rrs pixels





SeaWiFS Rrs670 over N Atlantic on 2/20/1998, original and recovered

Conclusions

- OCI is nearly immune to perturbations including cloud adjacency
- 7x5 stray light flag may be relaxed to 3x3 for low-Chl waters without losing quality
- The result will be >40% valid data volume for low-Chl waters
- The difficulty of lack of field validation from the “recovered” pixels may be circumvented from global statistics
- How to implement for low-Chl waters only?